Reprinted from Journal of Community Health, Vol. 22, No. 5, October 1997

HEALTH CARE COVERAGE: TRADITIONAL AND PREVENTIVE MEASURES AND ASSOCIATIONS WITH CHRONIC DISEASE RISK FACTORS

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ABSTRACT: Physician counseling of patients on health related activities is an essential component of chronic disease prevention, however this requires patients to have ready access to health care providers. Previous studies have explored access to health care in terms of health plans and cost without accounting for the lack of preventive coverage inherent in many insurance policies. This study compares two measures of health care access, one using an assessment of cost and health plan availability, and a new coverage measure including preventive services. Data was collected from 2574 adult respondents to the 1991–92 Missouri Behavioral Risk Factor Surveillance System Surveys. Odds ratios were generated for demographic variables, health related behaviors and preventive screening and the two coverage measures. Using health plan and cost 22% lacked full coverage, however including availability of preventive coverage almost 60% lacked full coverage for preventive care. For both coverage measures significant associations were found with age, exercise, marital status, routine checkup and mammography screening. Using the measure of coverage of preventive services, rural residents and those who had never had cholesterol screening were more likely to lack coverage. Inclusion of preventive care in measures of health care coverage may alter previously reported associations with socio-demographic and health related factors. Policy makers should realize that including preventive services in health care coverage greatly increases the number of individuals lacking adequate coverage, and that those lacking adequate coverage are the least likely to undergo preventive screening.

INTRODUCTION

Preventive screening and counseling to change personal health behaviors are increasingly recognized as cost-effective measures to reduce the

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morbidity and mortality associated with chronic diseases. The US Preventive Task Force recommends that physicians advise their patients regarding smoking cessation, weight loss and physical inactivity as well as the importance of undertaking preventive screening.[1] Several studies have demonstrated that physician recommendations for screening are an important factor in the use of screening services.[2,3] However, this counseling requires those patients in need of services to have ready access to health care providers.

Lack of health insurance is important in determining ease of access to care and has been shown to have a strong influence on an individuals health.[4–6] The number of Americans lacking health insurance remains high. It is estimated that in 1993, 53.1 million people (20% of Americans) were uninsured for at least some period of time during that year.[7,8]

However, health insurance alone is not a guarantee of adequate access to health care since health insurance often has gaps that make medical care unaffordable.[9] Co-payments, deductibles and failure of many insurance policies to cover screening and immunizations discourage preventive care.[10] In a 1987 National Medical Expenditure survey the insured made up three quarters of those reporting lack of needed health care.[11] Coverage by insurance policies that require large out-of-pocket payments has been termed under-insurance.[9] Based on various data sets for 1986–1989, 17% of businesses had health plans that failed to cover physicians office visits, 75% of group health insurance plans featured a deductible and coinsurance payment of 20% or more for physicians' services[12] and 56% of employer-sponsored health plans didn't cover physical examinations.[9] Lack of adequate insurance coverage can also have a negative impact upon preventive care. The RAND Health Insurance Experiment found that cost sharing deductibles result in lower utilization of health services.[13] Individuals with inadequate insurance coverage are more likely to use emergency departments and clinics where continuity of care is not possible and preventive services are offered less frequently.[14]

The majority of studies have explored access to health care and utilization of preventive services using the availability of a health plan, the usual source of care and cost barriers as measures of access. Few have taken into account the lack of preventive coverage inherent in many insurance policies.[15–19,11] Therefore previous estimates of access to health care may have over estimated the availability of preventive health care by assuming that those with a health plan would have full coverage for all preventive services.

This study used a new "preventive" measure of health coverage to examine levels of coverage for preventive health services by public or pri-

vate health plans. We examined socio-demographic factors, screening practices and health related behaviors associated with these different levels of coverage. Finally we compared this new preventive measure to the previously utilized measure of health care access incorporating only availability of a health plan and presence of cost barriers, which we termed the "traditional" measure.

METHODS

Data was collected from a probability sample of 3024 adult respondents aged 18–95 years to the Missouri Behavior Risk Factor Surveillance System (BRFSS) survey in 1991 and 1992. The BRFSS is a telephone survey developed by the Centers for Disease Control and Prevention (CDC) for monitoring self-reported health behaviors and has been reported in detail elsewhere.[20,21] The survey uses a multistage-cluster design and random digit telephone dialing.[22] In 1991 and 1992 the Missouri Department of Health added questions to the BRFSS exploring the amount of preventive services covered by an individuals health plan.

During the study period 1991 and 1992, the response rates to the Missouri BRFSS were 73.4% and 77.1%. We excluded 450 responses (14.8%) from the final analysis. Respondents were excluded because of missing values for socio-demographic variables (3.9%); health related behavior (5%); screening practices (3.9%); and the health coverage questions (0.6%). We excluded 1.5% who classified themselves racially as non-white, non-black. There were no significant differences ($p < 0.05$) for the variables that were utilized between the excluded sample and the analytic sample.

Variables

The age groups were divided so that those aged 18–44 years and those above 65 years of age could be examined separately. A body mass index (BMI) (weight (kg)/ height (m^2)) was calculated from the self reported height and weight, and using coding for overweight and normal weight (with cut off points of 27.8 for men and 27.3 for women).[23] We created three levels of leisure-time physical activity : inactive- those exercising less than 10 minutes a week; moderate activity- those exercising more than 10 minutes but less than 180 minutes a week; and high activity- those completing at least 180 minutes of exercise per week.

For women, compliance with cervical cancer screening was divided into two levels: those whose last Papanicolaou (Pap) smear was within one

year previously, and those whose last Pap was greater than one year ago or who had never had a Pap. Mammography screening practices were divided into two levels; compliant with screening recommendations and non-compliant, including those women aged 40–49 years who had not had a mammogram within the past two years, those women aged 49–85 years who had not had a mammogram within the past year and women aged 40–85 years who had never had a mammogram.[1]

We created three levels of health care coverage for both the traditional measure of health care access and the preventive measure; corresponding to no coverage, under covered and full coverage.

1. *Traditional measure of health insurance coverage:*

   a. No coverage: *No* health plan *and* experienced a cost barrier to needed health care in previous 12 months.
   b. Under-covered: *Either no* health plan *but no* cost barrier experienced *or* health plan but experienced a cost barrier to needed health care in previous 12 months.
   c. Full coverage: Health plan *and no* cost barrier experienced in past 12 months.

2. *Preventive measure of health insurance coverage:*

   a. No coverage: *No* coverage of preventive services under health plan, *or no* health plan.
   b. Under-covered: Health plan covers some preventive services *or* unsure of what preventive services covered.
   c. Fully covered: Health plan covers most or all preventive services

To control for any possible bias for those who did not know how much preventive coverage their health plan provided (268 respondents), we tested the associations excluding these respondents and coding them at each level of coverage. Furthermore, to avoid potential bias due to the coding of our traditional coverage measure we examined the associations using availability of health plan alone and reported cost barrier alone.

Statistical Analysis

We generated prevalence estimates of socio-demographic variables, health related behaviors, preventive screening practices, and health care coverage for both the traditional health coverage measure and the preventive coverage measure. For both coverage measures we used logistic regres-

sion to generate prevalence odds ratios[24] of having no coverage as opposed to having full coverage, across levels of these variables. We repeated this analysis for being under covered as opposed to fully covered for all variables. We evaluated the adequacy of the model by using standard methods of goodness of fit.[25] All analyses used SUDAAN to account for the complex sample design,[26] and were adjusted for potential confounders, including age, race, marital status, area of residency, educational status, smoking status, level of activity, cholesterol screening and routine checkup. The confounding effects of BMI and a history of hysterectomy in women were evaluated. Neither of these variables altered the associations and due to missing values for BMI, these variables were dropped from the model. We ruled out first-order interactions between socio-demographic factors, screening practice variables and health related behaviors by comparing models with and without the potential interaction variables

RESULTS

The demographic composition of the survey respondents was similar to Missouri census data. Respondents were predominantly white (91.9%), high school graduates (61.9%), female (57.9%), and aged between 18–44 years (52.8%) (Table 1). Over one third of the respondents reported no leisure time physical activity (36%) and one quarter were current smokers. Almost twenty percent reported having high cholesterol on screening (18.5%). In addition, almost one quarter of the female respondents (23.8%) were non-compliant with recommended mammography screening guidelines, and nearly one third (31%) had not had cervical cancer screening in the past year. Using the traditional measure, 4.5% reported both a lack of health plan and a cost barrier to needed medical services, whereas, 77.6% had no barriers to health care access using these measures. However, using the preventive measure , 36.1% reported no coverage for preventive services and only 41.4% reported a health care plan covering most or all preventive care (Table 1).

The traditional measure of health plan and cost found younger adults aged 18–44 years almost ten times more likely, those having less than a high school education six times more likely, and un-married respondents twice as likely to lack coverage as those over 65 years , college graduates or married respondents (Table 2). Males (OR = 0.6) were less likely to lack coverage. Using the preventive measure, unmarried (OR = 1.7), rural respondents (OR = 1.6) and those aged 18–44 years (OR = 2.7) and 45–64 years (OR = 2.7) were more likely to lack coverage. No signifi-

TABLE 1

Major Characteristics of the Study Population. Missouri BRFSS 1991, 1992 (n = 2574)

Factor	*Category*	*Number (%)*
Sex	Female	1491 (57.9%)
	Male	1083 (42.1%)
Age years	65+	557 (21.6%)
	45–64	659 (25.6%)
	18–44	1358 (52.8%)
Race	White	2365 (91.9%)
	African-American	209 (8.1%)
Education	College graduate	543 (21.1%)
	High School graduate	1593 (61.9%)
	< High school	438 (17.0%)
Health Care Coverage		
Traditional Measure[1]	No coverage	116 (4.5%)
	Under covered	460 (17.9%)
	Fully covered	1998 (77.6%)
Preventive Measure[2]	No coverage	929 (36.1%)
	Under covered	579 (22.5%)
	Fully covered	1066 (41.4%)

[1] Traditional Coverage: No coverage—No health plan and cost barrier to needed health care
Under covered—Either no health plan but no cost barrier, or Health plan but cost barrier
Fully covered—Health plan and no cost barrier

[2] Preventive Coverage: No coverage—No coverage of preventive services
Under covered—Health plan covers some preventive services
Fully covered—Health plan covers most or all preventive services

cant associations were found for preventive coverage with education or gender.

For the health related behaviors, those exercising less than ten minutes per week were more likely to lack coverage using both measures than those reporting moderate or high levels of physical activity. Current smokers were more likely to lack coverage using the traditional measure (OR = 3.2), but not using the preventive measure (Table 3).

Those without a recent routine checkup and women non compliant with mammography screening were twice as likely using the traditional measure, and one and a half times as likely using the preventive measure to lack coverage, compared with those compliant with screening. In addi-

TABLE 2

Adjusted Odds Ratios[1] Comparing No Coverage with Full Coverage for Both the Traditional[2] and Preventive[3] Coverage Measures Across Socio-Demographic Variables

		Traditional (n = 2114)		*Preventive (n = 1995)*	
		% no cover	*Odds Ratio (95% CI)*	*% no cover*	*Odds Ratio (95% CI)*
Sex	Female	6.0	1.0	47.0	1.0
	Male	4.8	0.6* (0.4, 1.0)	46.0	0.9 (0.8, 1.2)
Age years	65+	1.2	1.0	32.0	1.0
	45–64	4.8	4.9* (1.7, 13.6)	49.6	2.7* (1.9, 3.6)
	18–44	8.0	9.4* (3.7, 24.4)	50.5	2.7* (2.0, 3.8)
Race	White	5.2	1.0	47.1	1.0
	African-American	8.6	1.4 (0.6, 2.8)	41.5	0.8 (0.6, 1.2)
Marital Status	Married	4.7	1.0	44.7	1.0
	Un-Married	6.7	2.0* (1.2, 3.4)	49.3	1.7* (1.3, 2.1)
Residency	Urban	5.0	1.0	40.8	1.0
	Rural	6.0	1.3 (0.8, 2.0)	52.4	1.6* (1.3, 2.0)
Education	College graduate	1.4	1.0	43.0	1.0
	High School graduate	6.7	4.2* (1.7, 10.2)	48.0	1.1 (0.8, 1.4)
	< High school	6.9	5.7* (2.0, 16.4)	46.0	1.2 (1.8, 1.7)

[1] Adjusted for sex, age, race, area, education, smoking, exercise level, cholesterol screening, health checkup.

[2] No coverage = No health plan and cost barrier, Full coverage = Health plan and no cost barrier

[3] No coverage = No health plan or health plan but no coverage for preventive services, Full coverage = Health plan and coverage for all or most preventive services.

* significant at $p < 0.05$

tion, women not having recent cervical cancer screening were twice as likely to lack coverage using the traditional measure than those complying with these screening guidelines, although this only reached borderline significance. Lack of cholesterol screening (OR = 1.3) was associated with lack of coverage using the preventive measure (Table 3).

While less strong, the associations comparing under coverage with full coverage were similar to those comparing un-covered with fully covered, for both the traditional and preventive measures (tables not shown). African Americans were less likely to be under-covered compared to

TABLE 3

Adjusted Odds Ratios[1] Comparing No Coverage with Full Coverage for Both the Traditional[2] and Preventive[3] Coverage Measures Across Health Related Behaviors and Screening Practices

		Traditional (n = 2114)		*Preventive (n = 1995)*	
		% no cover	*Odds Ratio (95% CI)*	*% no cover*	*Odds Ratio (95% CI)*
Smoking	Never Smoked	3.5	1.0	47.5	1.0
	Former Smoker	3.5	1.2 (0.6, 2.2)	45.1	1.0 (0.8, 1.3)
	Current Smoker	12.1	3.2* (1.8, 5.4)	49.2	0.9 (0.7, 1.2)
Levels of leisure	High	4.1	1.0	42.2	1.0
time activity	Moderate	4.7	1.0 (0.6, 1.8)	45.9	1.3* (1.0, 1.7)
	Inactive	7.5	1.6* (1.0, 2.6)	51.1	1.5* (1.2, 2.0)
Screening					
Cholesterol	Screen Normal	3.9	1.0	43.3	1.0
	Never Screened	9.4	1.1 (0.6, 1.8)	57.7	1.3* (1.1, 1.7)
	Screened High	4.4	1.2 (0.6, 2.2)	37.5	0.7* (0.6, 1.0)
Routine Health	Within 1 yr	4.4	1.0	43.3	1.0
Checkup	Never/> 1 yr	9.7	1.9* (1.2, 3.0)	60.0	1.6* (1.3, 2.1)
Mammography #	Compliant	5.6	1.0	46.1	1.0
	Non Compliant	7.2	2.5* (1.2, 5.1)	50.0	1.6* (1.1, 2.3)
Pap smear #	Within 1 yr	4.5	1.0	45.4	1.0
	Never/> 1 yr	9.3	1.9 (0.9, 3.9)	50.6	1.1 (0.8, 1.6)

Includes only women n = 1216 for traditional measure, n = 1141 for preventive measure

[1] Adjusted for sex, age, race, area, education, smoking, exercise level, cholesterol screening, health checkup.

[2] No coverage = No health plan and cost barrier , Full coverage = Health plan and no cost barrier

[3] No coverage = No health plan or health plan but no coverage for preventive services, Full coverage = Health plan and coverage for all or most preventive services.

* significant at $p < 0.05$

Whites for preventive services (OR = 0.6. 95% Confidence Interval 0.3, 0.9).

DISCUSSION

In our study, the use of a traditional measure of health care coverage utilizing availability of health plan and experience of cost barriers, instead of a preventive measure, incorporating coverage of preventive services, may underestimate by more than one third the number of individuals lacking adequate coverage (22% vs 59%). Many of the associations between health coverage, socio-demographic factors, health related behavior and preventive screening practices remained constant for both the traditional and preventive measures. As in other studies,[18] age was the strongest predictor of coverage, with the lowest rates of coverage among those aged 18–44 years. Marital status, screening behaviors including routine health checkup and mammography, and health related behaviors such as physical inactivity were all associated with both measures of health care coverage. Nevertheless there were significant differences in some of the associations with health behaviors between the traditional measure and the preventive measure. Smoking, education and gender were associated with the traditional coverage measure, whereas area of residency and cholesterol screening practices were associated with the preventive coverage measure. These associations all remained after adjustment for potential confounding factors and after examining for possible bias due to misclassification of the outcome variables.

Our findings agree with previous reports for the traditional health coverage measure and age, education, marital status, mammography screening and routine health checkup.[18,27] The age association may be explained by the high rate of health care coverage through Medicare among those aged over 65 years, reported to be over 95%.[7] In addition, young adults are recognized as having higher rates of un-insurance.[8] The weaker associations with age for preventive measures may be due to a higher percentage of young adults enrolled in Health Maintenance Organizations (HMOs), as compared to fee-for-service plans.[28] Also, although Medicare covers some preventive services there are limits to which services are covered and in 1991 and 1992 many services required co-payments and deductibles.[29] Rural residency has been associated with lack of health coverage using traditional measures.[19] However, in our study the area of residency was associated with the preventive coverage measure but not with the traditional measure using health plan and cost. Those enrolled in HMOs,

which may provide more preventive care than other insurance plans, are less likely to live in rural areas[28] and this may partially account for the associations we found with preventive coverage.

Females were more likely to be uncovered using the traditional health coverage measure, a finding contrary to many of the reports on health insurance coverage.[18,30] This finding may be explained by the cost component of our traditional coverage measure, since we found no association using availability of a health plan alone.

Mammography compliance has been found to be more likely among women with health insurance using traditional measures of health coverage.[14] In our study, measuring preventive coverage did not substantially change this association. This finding agrees with studies indicating that women enrolled in prepaid health plans are more likely to have mammography than those in fee-for service plans where there may be out-of-pocket expenses associated with screening services.[28] Associations between cervical cancer screening and traditional measures of health care coverage have been reported.[14,31] In our study this association was of borderline significance, probably due to the small number of respondents lacking traditional coverage. However, compliance with cervical cancer screening was not associated with preventive coverage. This finding may be partially explained by the CDC-sponsored National Breast and Cervical Cancer Early Detection Program, which since 1991, has been offering cervical cancer screening to un-insured and under insured women in Missouri.[32,33]

The found association between leisure-time physical activity and traditional health care coverage has been reported.[34] In our study this association also held true for preventive coverage. Our findings of an association between traditional coverage and smoking may be explained by the inclusion of cost in our traditional measure. Smoking has been associated with education[35] and education has been used as a proxy for income.[36]

Having either a high school graduation or a college degree did not affect the likelihood of having preventive coverage. We are unaware of other reports showing this lack of association between education and preventive coverage. Since income may potentially confound this association we attempted to adjust for income knowing there was the possibility of introducing bias due to missing values. However, adjusting for income did not alter this association. One explanation for the lack of difference across educational levels when including preventive coverage may be that individuals with higher education may enroll in private insurance plans that do not cover preventive services, whereas those with less education are more likely to be covered by Medicaid which provides some coverage for preven-

tive services.[37] Replication of this study using nationwide data would be useful to confirm these findings.

There are several methodological issues of this study that need to be addressed. Telephone surveys tend to under-represent the indigent, African-Americans and males, and may result in an under representation of those lacking insurance. However, previous studies have found similar associations between traditional health coverage measures and the predictor variables.[27] Although 14.9% of the sample was excluded as a result of missing information, there were no significant differences for those demographic factors, health related behaviors, screening practices and health coverage measures that were available between the excluded sample and the analytic sample. It is possible that some individuals may have reported receipt of a routine health checkup for what was in fact an illness related visit or women may have reported cervical screening when they received only a pelvic examination. However, there is no reason to believe that any over reporting affected one group more than another. This survey also relies on self reported behavior and is therefore subject to recall bias. Although many of the questions used in the BRFSS have been validated in previous studies,[38,39] we are unaware of any validation studies using the questions regarding coverage of preventive services.

Assuming individuals uncertain about their level of coverage were more likely to lack full coverage, we classified 268 of these individuals as under-covered. Nevertheless, our findings held after analysis excluding this group, coding them as full coverage or no coverage. Another potential weakness is our inability to examine the effect of income on the associations due to the number of missing values for income. However, we adjusted for education which has been suggested as an effective marker of socioeconomic status and is thought to be correlated with income and occupation,[36] and has been shown to be reliably reported in BRFSS surveys.[40]

This study has three messages for researchers, managers and policy makers in public health. First, for both measures lack of coverage was associated with younger, un-married individuals who were physically inactive and lacked adequate preventive screening. However, researchers should be aware that factors associated with health care coverage may differ depending upon the measures of coverage utilized. Second, including preventive services in health care coverage measures greatly increases the number of individuals with inadequate coverage. Levels of coverage for preventive services need to be increased in order to help improve uptake of preventive screening. Third, which ever measure of health care coverage is used, pre-

ventive screening practices are underutilized among those who lack coverage or are under-covered. This group has increased rates of high risk health behaviors, are at risk for developing chronic disease[16] and thus has the greatest need for preventive services. Physicians should use every patient encounter as an opportunity to offer preventive health advice since those at greatest need are the least likely to attend for routine checkups. In addition, policy makers must realize that relying on physician advice to patients is not sufficient, increased efforts must be made for community interventions aimed at improving health related behaviors and screening practices.

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